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ABSTRACT

The purpose of this study was to examine the degree of forgetting of meaningful information learned to 90% criterion by thirty-nine college students in two introductory reading methods classes in the word recognition (exclusive of phonics) module of those classes. The amount of information gained was compared to forgetting to determine the percent of information lost by forgetting over a four to six week period. With the determinate gain technique used in this study, it was found that 19.3% of the information gained in this one module of the course was lost to forgetting, which is a considerably lower rate of forgetting than Ebbinghaus suggested for meaningless material. (MKM)

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Delayed Retention of Information Learned to Criterion for Proficiency Modular Instruction in a College Reading Methods Course

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The concept of mastery learning has been advanced by Bloom and others for use in teaching basic school subjects. Recently this concept has been advocated for use as one component of the proficiency module instructional mode (Houston and Howsam, 1972) for use in college educational methods courses. Proficiency modules with the mastery learning component are currently being used in reading methods courses at the University of Georgia where the students must meet a criterion of 90% on subject matter tests in order to be considered proficient on that component of the module.

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Research done by Ebbinghaus with an N of 1 in 1885 suggests that 66.3% of what one learns is forgotten in twenty-four hours if the information is meaningless. Sterrett and Davis (1954) reviewed studies dealing with retention of meaningful material by college students. The findings indicate that differential retention can be expected dependent upon two factors: 1) the time period between posttest and retention test, and 2) upon the nature of the material. The amount of information lost by students in the reviewed studies ranged from fifty per cent over a four-month period to as high as ninety per cent after one year. The greatest loss was in technical information dealing with facts whereas little loss was found in the application of principles. Highest retention was in United States history, ancient history, and geometry while lowest retention was in physics, chemistry, and Latin. The concept of mastery learning was not employed in the studies reviewed and few of them used a determinate gain technique requiring the use of a pretest. Thus, while useful information was presented, it had limited application to the principles of mastery learning.

The purpose of this study was to examine the degree of forgetting of meaningful information learned to criterion by thirty-nine college students in two introductory reading methods classes. The amount of information gained was compared to forgetting to determine the per cent of information lost by forgetting over a four to six week period.

Method

Subjects. Study subjects included 39 University of Georgia juniors

and seniors majoring in either elementary education or special education. All were enrolled in their initial course in reading methodology -- ERD 401, The Teaching of Reading -- during the summer quarter, 1973.

Materials. For the purposes of this study, only the first module in the University of Georgia's series of 10 reading modules was used. Module One: Word Recognition Skills (Exclusive of Phonics and Related Skills) was developed by Aaron, Scott, Raetsch, and Peterson (1971) of the University of Georgia with technical assistance from Bronner, Morrison, and the reading resource teachers employed by the Atlanta, Georgia, Public School System. The module was designed to teach background information about sight vocabulary, context clues, structural analysis, and dictionary skills. In order to master the module objectives, the students were provided with four alternate learning routes. The routes included: 1) selected readings from Teaching Word Recognition Skills (Aaron, 1970) with an accompanying study guide; 2) an audio tape and a listening guide; 3) two 30-minute kinescopes (Aaron, 1965) entitled "Teaching Word Recognition Skills," Parts I and II, with listening-viewing guides; and 4) a workshop session conducted by the instructor. The workshops tended to be individual or small group sessions with the instructor.

In addition, all students completed several required activities. These activities, as described in the directions for completing this module, included: 1) the study of a mimeographed set of word recognition exercises; 2) the study of pupil behaviors; 3) the preparation of exercises for teaching each of three word recognition skills; and 4) the use of one of the exercises to teach a small group of fellow students.

Research design. By using the technique of determinate gain -- pretest, posttest, retention test -- it is possible to obtain a more accurate picture of just how much forgetting actually takes place.

The pretest scores indicated how much of the material was known by the students prior to the learning experience. Since 90% had been established as the criterion for completion of the knowledge portion of the module, the posttest score for each student was set at 90% or 43 correct items out of 48 possible raw score points. The retention test, or delayed posttest, was administered to determine the per cent of forgetting. Thus the amount of information gained (difference between pretest and criterion score) was compared to net gain (difference between pretest and retention test) to determine the percentage of information lost by forgetting over a four to six week period.

Procedure. During the summer quarter, 1973, students in two sections of ERD 401, The Teaching of Reading, were selected to participate in this study. The course content was similar to that of other introductory reading methods courses; however, three of the topics -- word recognition (exclusive of phonics), phonics, and comprehension -- were taught via the proficiency modules developed by the Reading Department staff, University of Georgia. The two sections -- third and seventh periods -- were taught by the same instructor. Course content and format were identical for each section.

Classes for the summer term began on Tuesday, June 12, 1973, and continued through Wednesday, August 8, 1973. The first week of class was spent establishing background and preparing for the module phase

of the class. The pretest for the first module was administered to all students on Wednesday, June 20. Each student received a complete set of Module One materials on that same day. Students then were charged with the responsibility of completing the modular material at their own pace.

Each Wednesday was devoted to topics other than those covered in the modules. During the other four days of the week, students worked on the modules during open laboratory sessions. These sessions were supervised by the instructor and a graduate assistant and provided an opportunity for the students to take a module pretest or posttest, to discuss test results, to listen to an audio tape, to view a kinescope, to teach a lesson to a group of fellow students, to discuss procedural questions, and/or to explore problem areas with the instructor and/or graduate assistant.

On or before Friday, July 6, all students had passed with 90% proficiency the paper and pencil test for the word recognition module and had completed the required additional activities.

Students continued working on the remaining modules and attending the Wednesday class sessions through Friday, July 27. The final week and a half of the term was devoted to classroom activities in non-module areas. On Tuesday, August 7, and without their prior knowledge, the students were administered a posttest for Module One material. Slightly over four weeks elapsed from the time the last student completed the word recognition module until the administration of the retention test over the word recognition material.

Two equivalent forms of a 48-item multiple choice test were used as the evaluation instruments. Developed as an integral part of the module material, the tests were designed to evaluate the students' knowledge of word recognition skills. Each item on Form A had a parallel item on Form B. In order to insure equality of forms, one-half of the study subjects were randomly selected to receive Form A as a pretest evaluation instrument while the remaining students received Form B. For purposes of delayed posttesting, the forms were reversed so that each student received a different form for the retention test.

Results

Pretesting of the students with half receiving each form of the test yielded a mean score of 28.44 of the 48-item test (approximately 59.4%) prior to starting the proficiency module. Criterion for completion of the module was a raw score of 43 for a 90% proficiency level. The mean gross gain on this portion of the module, then, was 14.56 items or approximately 30.2% of information tested.

At the end of the term, parallel versions of the test were given so that each subject received the test not taken as the pretest. The difference between pretest and retention test ($\bar{X}$ = 40.18) resulted in a net gain of 11.74 or 24.4% of total information (σ = 4.11; Variance = 16.91; t = 17.61; with 38df, $p < .001$). Thus, the net gain was significantly different from zero.

The net gain and gross gain were then compared to determine whether the information lost to forgetting was significant. The mean loss of information was 2.82 raw score points and was significant at the .001

level(δ = 2.93; Variance = 8.56, t = 5.95 with 38df). The information lost to forgetting over the four to six weeks period was computed as being 19.3%.

The previous research on information retained does not offer much that is usable in terms of determining whether or not the conditions of preparing to meet an a priori criterion score results in greater retention. One consideration is that most studies on retention have not used the technique of determinate gain in order to take into consideration the students' knowledge acquired independent of the course. Such studies have only an end test and a delayed retest and as such depend upon the assumption that everything an individual learned about the subject was directly the result of the course offered. In all probability, however, individuals will know something about an area before enrolling in a course on it. This could result in some spuriously high retention rates for certain areas and may partially account for Starrett & Davis's (1954) observation that principles and generalizations are retained best whereas specific facts are not retained so well.

Summary and Conclusions

The present study examines the degree of forgetting of meaningful information learned to criterion by 39 college students in reading methods classes. The amount of information gain (difference between pretest and criterion score) is compared to net gain (difference between pretest and retention test) to determine the percentage of information lost by forgetting over a four to six week period. With the determinate

gain technique used in this study, it was found that 19.3% of the information gained in one portion of the course was lost to forgetting.

Because most other studies on retention used an indeterminate gain technique, no meaningful comparisons can be made with other data. It cannot be determined, for example, whether or not the overlearning which students typically report engaging in to meet criterion for mastery has decreased the amount of information lost. It does suggest, however, that there is a much lower rate of forgetting with meaningful information than Ebbinghaus has suggested for meaningless material.

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